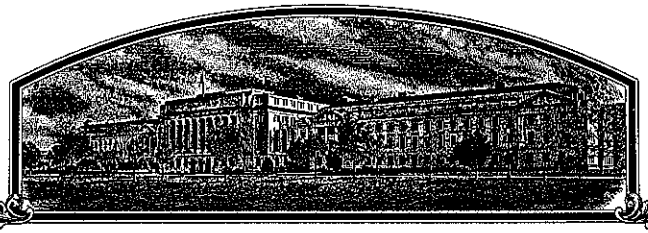
No. 9200233



THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Texas Agricultural Experiment Station

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

AN APPLICATION REQUESTING A CERTIFICATE OF PROTECTION FOR AN ALLEGED NOVEL VARIETY OF SEXUALLY REPRODUCED PLANT, THE NAME AND DESCRIPTION OF WHICH ARE CONTAINED IN THE APPLICATION AND EXHIBITS, A COPY OF WHICH IS HEREUNTO ANNEXED AND MADE A PART HEREOF, AND THE VARIOUS REQUIREMENTS OF LAW IN SUCH CASES MADE AND PROVIDED HAVE BEEN COMPLIED WITH, AND THE TITLE THERETO IS, FROM THE RECORDS OF THE PLANT VARIETY PROTECTION OFFICE, IN THE APPLICANT(S) INDICATED IN THE SAID COPY, AND WHEREAS, UPON DUE EXAMINATION MADE, THE SAID APPLICANT(S) IS (ARE) ADJUDGED TO BE ENTITLED TO A CERTIFICATE OF PLANT VARIETY PROTECTION UNDER THE LAW.

NOW, THEREFORE, THIS CERTIFICATE OF PLANT VARIETY PROTECTION IS TO GRANT UNTO THE SAID APPLICANT(S) AND THE SUCCESSORS, HEIRS OR ASSIGNS OF THE SAID APPLICANT(S) FOR THE TERM OF eighteen YEARS FROM THE DATE OF THIS GRANT, SUBJECT TO THE PAYMENT OF THE REQUIRED FEES AND PERIODIC REPLENISHMENT OF VIABLE BASIC SEED OF THE VARIETY IN A PUBLIC REPOSITORY AS PROVIDED BY LAW, THE RIGHT TO EXCLUDE OTHERS FROM SELLING THE VARIETY, OR OFFERING IT FOR SALE, OR REPRODUCING IT, IMPORTING IT, OR EXPORTING IT, OR USING IT IN PRODUCING A HYBRID OR DIFFERENT VARIETY THEREFROM, TO THE EXTENT PROVIDED BY THE PLANT VARIETY PROTECTION ACT. UNITED STATES SEED OF THIS VARIETY (1) SHALL BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED AND (2) SHALL CONFORM TO THE NUMBER OF GENERATIONS [illegible] THE OWNER OF THE RIGHTS. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

WHEAT

'TAM 202'

In Testimony Whereof, I have hereunto set my hand and caused the seal of the Plant Variety Protection Office to be affixed at the City of Washington, D.C. this 28th day of April in the year of our Lord one thousand nine hundred and ninety-five.

Attest:

Kenneth A. Evans
Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Dan Glickman
Secretary of Agriculture

FORM APPROVED: OMB 0581-0055, Expires 1/31/91

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

(Instructions on reverse)

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421). Information is held confidential until certificate is issued (7 U.S.C. 2426).

1. NAME OF APPLICANT(S) *(as it is to appear on the Certificate)*
Texas Agricultural Experiment Station

2. TEMPORARY DESIGNATION OR EXPERIMENTAL NO.
Tx86V1405

3. VARIETY NAME
TAM 202

4. ADDRESS *(street and no. or R.F.D. no., city, state, and ZIP)*
College Station, TX 77843

5. PHONE *(Include area code)*
409/845-4051

FOR OFFICIAL USE ONLY

PVPO NUMBER
9200233

FILING Date: July 13, 1992
Time: ☐ A.M. ☐ P.M.

FEES RECEIVED
Filing and Examination Fee: $ 2150.00 Date: May 22, 1992
Certificate Fee: $ 250.00 Date: Mar. 28, 1995

6. GENUS AND SPECIES NAME
Triticum aestivum L. Thell

7. FAMILY NAME *(Botanical)*
gramineae

8. CROP KIND NAME *(Common Name)*
wheat

9. DATE OF DETERMINATION
June 1985

10. IF THE APPLICANT NAMED IS NOT A "PERSON," GIVE FORM OF ORGANIZATION *(Corporation, partnership, association, etc.)*
official Public Agricultural Research Agency of the State of Texas

11. IF INCORPORATED, GIVE STATE OF INCORPORATION

12. DATE OF INCORPORATION

13. NAME AND ADDRESS OF APPLICANT REPRESENTATIVE(S), IF ANY, TO SERVE IN THIS APPLICATION AND RECEIVE ALL PAPERS
Dr. Paul G. Sebesta
Texas Foundation Seed
Texas Agricultural Experiment Station
College Station, TX 77843-2581
PHONE *(Include area code)*: 409/845-4051

14. CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED *(Follow INSTRUCTIONS on reverse)*

a. [X] Exhibit A, Origin and Breeding History of the Variety.
b. [X] Exhibit B, Novelty Statement.
c. [X] Exhibit C, Objective Description of Variety.
d. [X] Exhibit D, Additional Description of Variety.
e. [X] Exhibit E, Statement of the Basis of Applicant's Ownership.
f. [X] Seed Sample (2,500 viable untreated seeds). Date Seed Sample mailed to Plant Variety Protection Office 5-22-92.
g. [X] Filing and Examination Fee ($2,150) made payable to "Treasurer of the United States."

15. DOES THE APPLICANT(S) SPECIFY THAT SEED OF THIS VARIETY BE SOLD BY VARIETY NAME ONLY AS A CLASS OF CERTIFIED SEED? *(See section 83(a) of the Plant Variety Protection Act.)*
[X] YES *(If "YES," answer items 16 and 17 below)* [ ] NO *(If "NO," skip to item 18 below)*

16. DOES THE APPLICANT(S) SPECIFY THAT THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
[X] YES [ ] NO

17. IF "YES" TO ITEM 16, WHICH CLASSES OF PRODUCTION BEYOND BREEDER SEED?
[X] FOUNDATION [X] REGISTERED [X] CERTIFIED

18. DID THE APPLICANT(S) PREVIOUSLY FILE FOR PROTECTION OF THE VARIETY IN THE U.S.?
[ ] YES *(If "YES," through* [ ] Plant Variety Protection Act [ ] Patent Act. Give date: _____ .)
[X] NO

19. HAS THE VARIETY BEEN RELEASED, USED, OFFERED FOR SALE, OR MARKETED IN THE U.S. OR OTHER COUNTRIES?
[ ] YES (If "YES," give names of countries and dates)
[X] NO

20. The applicant(s) declare(s) that a viable sample of basic seeds of this variety will be furnished with the application and will be replenished upon request in accordance with such regulations as may be applicable.

The undersigned applicant(s) is (are) the owner(s) of this sexually reproduced novel plant variety, and believe(s) that the variety is distinct, uniform, and stable as required in section 41, and is entitled to protection under the provisions of section 42 of the Plant Variety Protection Act.

Applicant(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF APPLICANT *(Owner(s))*	CAPACITY OR TITLE	DATE
Paul G. Sebesta	Director, Texas Foundation Seed	5-18-92
SIGNATURE OF APPLICANT *(Owner(s))*	CAPACITY OR TITLE	DATE

Exhibit A. Origin and Breeding History of TAM-202

TAM-202 was developed from a random outcross to the hard red winter wheat variety Siouxland, which occurred in the greenhouse at the Texas Agricultural Experiment Station at Vernon, TX in 1982. The F1 of this outcross was grown in the greenhouse at Vernon in 1983. Individual heads were selected from the F2 population grown in the field at Chillicothe, TX in 1984 and F3 headrows were grown at Chillicothe in 1985. Seed from an individual headrow, identified as TX86V1405, was planted in the Preliminary 4 replicated yield test at Chillicothe in 1986, the replicated Advanced 4 in 1987 and in uniform statewide performance tests in 1988. In 1989 and 1990, TAM-202 was entered in the Southern Regional Performance Nursery. In 1989, 200 uniform headrows of TAM-202 were harvested from a seed purification nursery at Lockett, TX. Seed from each headrow was planted as an observation plot in 1990 and uniform plots were bulked to provide Breeder Seed. This Breeder Seed was grown under irrigation at Lockett in 1991 and was released to the Texas Foundation Seed Service at the 1991 harvest.

TAM-202 has been observed to be stable and uniform in field performance tests, seed multiplication fields and commercial production fields for eight years.

Exhibit B: Novelty of TAM-202

TAM-202 expresses and array of performance characteristics unique to hard red winter wheats adapted to Texas. It is resistant to the races of powdery mildew (conditioned by the fungus Erisyphe graminis) currently prevalent in Texas. TAM-202 carries the genes designated LR24 and LR26 for resistance to leaf rust (Puccinia recondita) and SR31 for resistance to stem rust (Puccinia graminis f. sp. tritici). It was moderately resistant to stripe rust (Puccinia striiformis) in a field test in Lind, WA in 1990. TAM-202 is tolerant of aluminum toxic soils as determined by hematoxylin staining of seedling roots. TAM-202 is susceptible to biotype E greenbug and to the Great Plains biotype of the Hessian fly. Average Julian days to heading in the 1990 Southern Regional Performance Nursery was 131 for TAM-202 compared to 129 for TAM-107 and 136 for Scout 66. Kernel hardness of TAM-202 has been consistently higher than TAM-200 and generally in the mid-range of hardness values for hard red winter wheats.

TAM-202 is similar to its female parent Siouxland. TAM-202 differs from Siouxland in several ways including the following:

1. Siouxland is heterogeneous for the IBL/IRS wheat-rye chromosome translocation whereas, TAM-202 is heterogeneous for the 1AL/IRS wheat/rye chromosome translocation.
2. Siouxland is possesses genes designated LR24 and LR26 which confer resistance to leaf rust (incited by Puccinia recondita). TAM-202 possesses genes designated LR24 and LR26, similarly to Siouxland, but also contains the gene for leaf rust resistance designated LR2c and an additional unspecified genetic factor conferring adult plant resistance.

FORM APPROVED: OMB NO. 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
LIVESTOCK AND SEED DIVISION
BELTSVILLE, MARYLAND 20705

EXHIBIT C
(Wheat)

OBJECTIVE DESCRIPTION OF VARIETY
WHEAT (*TRITICUM SPP.*)

INSTRUCTIONS: *See Reverse.*

NAME OF APPLICANT(S)

Texas Agricultural Experiment Station

ADDRESS (*Street and No. or R.F.D. No., City, State, and ZIP Code*)

Texas Foundation Seed
College Station, Tx. 77843-2581

FOR OFFICIAL USE ONLY

PVPO NUMBER: 9200233

VARIETY NAME OR TEMPORARY DESIGNATION:

Place the appropriate number that describes the varietal character of this variety in the boxes below.
Place a zero in first box (e.g. [0][8][9] or [0][9]) when number is either 99 or less or 9 or less.

1. KIND:

[1] 1 = COMMON 2 = DURUM 3 = EMMER 4 = SPELT 5 = POLISH 6 = POULARD 7 = CLUB

2. TYPE:

[2] 1 = SPRING 2 = WINTER 3 = OTHER (*Specify*) _____ [2] 1 = SOFT 2 = HARD 3 = OTHER (*Specify*) _____

[2] 1 = WHITE 2 = RED 3 = OTHER (*Specify*) _____

3. SEASON - NUMBER OF DAYS FROM EMERGENCE TO:

[ ][ ][ ] FIRST FLOWERING [ ][ ][ ] LAST FLOWERING

4. MATURITY (*50% Flowering*):

[0][5] NO. OF DAYS *EARLIER* THAN ..... [2] 1 = ARTHUR 2 = SCOUT 3 = CHRIS

[ ][ ] NO. OF DAYS *LATER* THAN ..... [ ] 4 = LEMHI 5 = NUGAINES 6 = LEEDS

5. PLANT HEIGHT (*From soil level to top of head*):

[0][8][2] CM. HIGH

[ ][ ] CM. TALLER THAN ..... [ ]

[1][4] CM. SHORTER THAN ..... [2] 1 = ARTHUR 2 = SCOUT 3 = CHRIS 4 = LEMHI 5 = NUGAINES 6 = LEEDS

6. PLANT COLOR AT BOOTING (*See reverse*):

[2] 1 = YELLOW GREEN 2 = GREEN 3 = BLUE GREEN

7. ANTHER COLOR:

[1] 1 = YELLOW 2 = PURPLE

8. STEM:

[ ] Anthocyanin: 1 = ABSENT 2 = PRESENT

[1] Waxy bloom: 1 = ABSENT 2 = PRESENT

[1] Haiciness of last internode of rachis: 1 = ABSENT 2 = PRESENT

[1] Internodes: 1 = HOLLOW 2 = SOLID

[ ][4] NO. OF NODES (*Originating from node above ground*)

[1][8] CM. INTERNODE LENGTH BETWEEN FLAG LEAF AND LEAF BELOW

9. AURICLES:

[1] Anthocyanin: 1 = ABSENT 2 = PRESENT

[1] Haiciness: 1 = ABSENT 2 = PRESENT

10. LEAF:

[1] Flag leaf at booting stage: 1 = ERECT 2 = RECURVED 3 = OTHER (*Specify*): _____

[1] Flag leaf: 1 = NOT TWISTED 2 = TWISTED

[1] Hairs of first leaf sheath: 1 = ABSENT 2 = PRESENT

[1] Waxy bloom of flag leaf sheath: 1 = ABSENT 2 = PRESENT

[1][2] MM. LEAF WIDTH (*First leaf below flag leaf*)

[2][8] CM. LEAF LENGTH (*First leaf below flag leaf*):

FORM LMGS 470-6 (6-82) (Formerly Form LPGS 470-6 (3-79), which may be used)

(cont'd other side)

4

9200233

11. HEAD:

[1] Density: 1 = LAX 2 = DENSE

[2] Shape: 1 = TAPERING 2 = STRAP 3 = CLAVATE 4 = OTHER (Specify) _____

[4] Awnedness: 1 = AWNLESS 2 = APICALLY AWNLETED 3 = AWNLETED 4 = AWNED

[2] Color at maturity: 1 = WHITE 2 = YELLOW 3 = PINK 4 = RED 5 = BROWN 6 = BLACK 7 = OTHER (Specify): _____

[ ][8] CM. LENGTH [1][2] MM. WIDTH

12. GLUMES AT MATURITY:

[3] Length: 1 = SHORT (CA. 7 mm.) 2 = MEDIUM (CA. 8 mm.) 3 = LONG (CA. 9 mm.)

[2] Width: 1 = NARROW (CA. 3 mm.) 2 = MEDIUM (CA. 3.5 mm.) 3 = WIDE (CA. 4 mm.)

[2] Shoulder shape: 1 = WANTING 2 = OBLIQUE 3 = ROUNDED 4 = SQUARE 5 = ELEVATED 6 = APICULATE

[2] Beak: 1 = OBTUSE 2 = ACUTE 3 = ACUMINATE

13. COLEOPTILE COLOR:

[1] 1 = WHITE 2 = RED 3 = PURPLE

14. SEEDLING ANTHOCYANIN:

[1] 1 = ABSENT 2 = PRESENT

15. JUVENILE PLANT GROWTH HABIT:

[2] 1 = PROSTRATE 2 = SEMI-ERECT 3 = ERECT

16. SEED:

[1] Shape: 1 = OVATE 2 = OVAL 3 = ELLIPTICAL

[1] Cheek: 1 = ROUNDED 2 = ANGULAR

[1] Brush: 1 = SHORT 2 = MEDIUM 3 = LONG

[1] Brush: 1 = NOT COLLARED 2 = COLLARED

[ ] Phenol reaction (See instructions): 1 = IVORY 2 = FAWN 3 = LT. BROWN 4 = BROWN 5 = BLACK

[3] Color: 1 = WHITE 2 = AMBER 3 = RED 4 = PURPLE 5 = OTHER (Specify) _____

[ ][6] MM. LENGTH [ ][3] MM. WIDTH [2][6] GM. PER 1000 SEEDS

17. SEED CREASE:

[1] Width: 1 = 60% OR LESS OF KERNEL ~~WIDTH~~ Scout 2 = 80% OR LESS OF KERNEL 'CHRIS' 3 = NEARLY AS WIDE AS KERNEL 'LEMHI'

[1] Depth: 1 = 20% OR LESS OF KERNEL 'SCOUT' 2 = 35% OR LESS OF KERNEL 'CHRIS' 3 = 50% OR LESS OF KERNEL 'LEMHI'

18. DISEASE: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[2] STEM RUST (Races) HNLQ RTQQ

[2] LEAF RUST (Races) _____

[2] STRIPE RUST (Races) _____

[ ] LOOSE SMUT

[2] POWDERY MILDEW

[0] BUNT

[ ] OTHER (Specify) _____

19. INSECT: (0 = Not Tested, 1 = Susceptible, 2 = Resistant)

[0] SAWFLY

[ ] APHID (Bydv.)

[ ] GREEN BUG

[ ] CEREAL LEAF BEETLE

[ ] OTHER (Specify) _____

HESSIAN FLY RACES: [1] GP [ ] A [ ] B [ ] C [ ] D [ ] E [ ] F [ ] G

20. INDICATE WHICH VARIETY MOST CLOSELY RESEMBLES THAT SUBMITTED:

CHARACTER	NAME OF VARIETY	CHARACTER	NAME OF VARIETY
Plant tillering	TAM-200	Seed size	TAM-200
Leaf size	TAMW-101	Seed shape	TAM-200
Leaf color	TAM-201	Coleoptile elongation	
Leaf carriage	TAM W-101	Seedling pigmentation	

INSTRUCTIONS

GENERAL: The following publications may be used as a reference aid for the standardization of terms and procedures for completing this form:

(a) L.W. Briggle and L. P. Reitz, 1963, Classification of Triticum Species and Wheat Varieties Grown in the United States. Technical Bulletin 1278, United States Department of Agriculture.

(b) W.E. Walls, 1965, A Standardized Phenol Method for Testing Wheat Seeds for Varietal Purity, contribution No. 28 to the handbook of seed testing prepared by the Association of Official Seed Analysts. (See attachment.)

LEAF COLOR: Nickerson's or any recognized color fan should be used to determine the leaf color of the described variety.

Exhibit D

9200233

Proposal to Release TX86V1405 as an Improved Variety of Hard Red Winter Wheat

W. D. Worrall, S. P. Caldwell, D. S. Marshall, M. E. McDaniel,
S. Serna-Saldivar, and M. D. Lazar

TX86V1405 was developed from a greenhouse outcross to the hard red winter wheat variety Siouxland. A row of Siouxland was planted in the greenhouse at Vernon, TX in 1982 for use in crossing. An emasculated head apparently outcrossed prior to being protected. The F1 of this outcross was grown in the greenhouse at Vernon in 1983. Individual heads were randomly selected from the F2 population grown in the field at Chillicothe, TX in 1984 and F3 headrows from this population were grown at Chillicothe in 1985. In 1989, 200 uniform headrows were selected and harvested at Lockett, Texas. Seed from each headrow was planted as an observation plot at Lockett in 1990 and uniform plots were bulked to provide breeder seed.

TX86V1405 is an awned, semidwarf, hard red winter wheat with white chaff. It is primarily adapted to the Rolling Plains of Texas and irrigated production on the High Plains of Texas. It may be too short for dryland production on the High Plains.

Yield Performance:

TX86V1405 was entered in the 1986 Preliminary 4 replicated performance test at Chillicothe in which it yielded 36.6 bu/a, not significantly different from the highest yielding check variety, Mustang (Table 1). Although its yield in 1986 was not significantly different from any of the check varieties, it produced more grain than all checks except Mustang. TX86V1405 also had shorter stature and had higher test weight than the checks and headed earlier than any of the checks except Mustang. It was selected for further testing based upon its yield and test weight and because it carried a very low level of leaf rust infection in observation nurseries planted at Temple and Uvalde. In 1987, TX86V1405 was entered in the replicated Advanced 4 performance test at Chillicothe, and ranked second among 40 entries in grain yield, headed one day earlier than TAM-200, and had a test weight equal to TAM-200 (Table 1). TX86V1405 was first entered in uniform performance tests in 1988 in the Central Texas Yield Trial (Table 2) where its grain yield ranked 1st at Bushland, 5th at Chillicothe, 11th at Dallas, 21st at Overton and 1st over all locations. Average test weight of TX86V1405 was higher than any of the checks in the CTYT except TAM-200. In 1989 and 1990, TX86V1405 was entered in the Texas Uniform Wheat Elite (Tables 3 and 4). Data from many locations in 1989 either were not collected or were somewhat suspect due to a late season freeze which decimated wheat production in many areas of the Great Plains. Damage caused by the freeze was primarily related to the stage of maturity of each genotype rather than a true reflection of cold hardiness. This factor was evident in the performance of TX86V1405, which was the highest yielding entry in the Southern Regional Performance Nursery at Lincoln, NE in 1989 but was the third lowest yielding entry in the SRPN at Chillicothe. The effect of growth stage on the late-season freeze damage also was evident in the performance of TX86V1405 in two 1989 wheat performance tests planted in close proximity at Chillicothe. The only difference in the two tests was date of planting and, consequently stage of maturity when the late-season freeze occurred. TX86V1405 was the highest yielding of the 40 entries in one of these tests but ranked 43rd among 45 entries in the other test. Over the 4 Texas locations which harvested the Wheat Elite in 1989, TX86V1405 yielded 24 bu/a and ranked 17th among the uniform entries but was higher yielding than any of the checks. In the 1990 Wheat Elite, TX86V1405 ranked 4th in average grain yield over all harvested locations. It ranked 21st in the Rolling Plains, 14th in the Blacklands, and 1st on the High Plains. Its average grain yield was higher than the checks Siouxland 89, TAM-107, TAM W-101 and Collin but was slightly lower than TAM-200 and TAM-201. Test weight of TX86V1405 in the 1989 and 1990 Wheat Elite was as higher or higher than all checks except the high test weight check, TAM-200 (Table 4).

In 1989 and 1990 TX86V1405 also was entered in the Southern Regional Performance Nursery (SRPN) where it ranked 13th and 1st, respectively, in average yield over all Great Plains locations which reported data. Regression analyses of 1989 data show that it is very responsive to improvements in environment with a regression coefficient of 1.20 and a coefficient of determination of 0.91. TX86V1405 also was planted in a 10-location genotype x environment interaction study in Nebraska in 1990 and yielded highest of the 30 entries in the test.

Agronomic Performance

TX86V1405 is a medium maturing wheat which reaches 50% spike emergence slightly earlier than TAMW-101 and slightly later than TAM-201(Table 5). Average heading date (Julian days) over all locations harvesting the 1989 and 1990 Wheat Elite was 113 for TX86V1405, 121 for TAMW-101 and 106 for TAM-201. These differences in relative maturity are less important on the High Plains than in Central Texas. This is probably due to the greater importance of temperature as a maturity-determining factor in Central Texas and photoperiod as a maturity-determining factor on the High Plains. Average height of TX86V1405 for harvested locations in the Rolling Plains in 1989-90 was 69cm compared to 63 cm for TAM-201 and 72 cm for TAMW-101. Summary data from the 1989 SRPN show that, region-wide, TX86V1405 headed earlier and was shorter than any of the check varieties grown in the nursery.

Four locations in the 1989 SRPN reported lodging data which was rated on a 1-9 scale. The propensity to lodging for TX86V1405 was rated the same as that for TAM-105 (rating=2) and substantially lower than that of the check varieties Scout 66 and Kharkof (rating=6).

Hematoxylin staining of seedling roots was conducted at Oklahoma State University on all entries in the 1989 SRPN. This test is conducted to determine resistance to aluminum toxicity in soil. Results of this test show that TX86V1405 is tolerant of high levels of aluminum, which can be a production constraint in areas with low pH soils. While this is not considered a major constraint to production in Texas, it may be a positive factor for distribution of TX86V1405 into states such as Oklahoma which have large areas with aluminum toxic soils.

TX86V1405 was included in seeding rate studies at Chillicothe in 1989 and 1990. This study is conducted annually to assist producers in streamlining cultural practices to best suit the genotypes currently available. Highest yields of TX86V1405 were achieved with intermediate planting rates; however, grain yield at the lowest rate of planting was not significantly different than the rate with the highest yield in 1989 and only slightly higher in 1990. TX86V1405 appears to tiller profusely, which may account for its lack of significant response to increases in planting rate. Lower required seeding rates should make this variety attractive to producers in both grain-only and grazing-grain production systems.

Disease Resistance:

TX86V1405 is heterogeneous for the 1A/1R translocation which probably originated from the germplasm line Amigo. While not immune to powdery mildew, it carries enough resistance to thwart all but the most severe epidemic. It has never been rated higher than a 1 for powdery mildew (0-9 scale) and in most cases has been free of the disease in field and greenhouse tests.

In early field tests, TX86V1405 was resistant to the races of leaf rust prevalent in Texas field tests. Due to Texas' rapidly changing race regime, this is no longer the case. However, it does carry sufficient resistance for the Rolling Plains and High Plains of Texas in all but the most severe rust years. In tests of adult plant reaction to leaf and stem rust in inoculated nurseries at the Cereal Rust Laboratory in St. Paul, MN, TX86V1405 was rated 30S for leaf rust and 30MR-MS for stem rust. Seedling tests at St. Paul indicate that TX86V1405 contains the genes Sr5 and Sr31 for stem rust resistance. Genes for leaf rust resistance have not yet been determined.

End-Use Quality:

Analysis of dough mixing characteristics was first carried out on TX86V1405 in 1986 on grain from the Chillicothe Preliminary 4 Nursery (Table 6). Results showed that it had 0.4% higher flour protein and 4% higher water absorption than TAMW-101. Its mixograph mixing time was 4:35; 1:15 longer than TAMW-101. The general appearance of the mixograph was judged satisfactory by the staff at the Cereal Quality Laboratory at College Station.

No quality analyses were performed on TX86V1405 in 1987, however, in 1988, both mixograph and baking analyses were performed at the Cereal Quality Lab on grain produced in the Central Texas Yield Trial (Table 6). From composite grain samples originating from research nurseries at Beeville, McGregor and Uvalde, flour protein of TX86V1405 was 0.1% higher than Collin and 0.8% higher than TAM-200 but 0.5% lower than Mit (Table 6). Flour yield was equal to that of Mit and 1% lower than the flour yield of TAM-200. Water absorption was higher than Collin or TAM-200 but lower than Mit. The mixograph of TX86V1405 was judged questionable; the same rating as Collin and TAM-200 but lower than the questionable-fair rating of Mit. CTYT grain samples also were analyzed from Dallas nurseries in 1988. Greater variations in milling yield were seen in these samples with TX86V1405 being substantially lower in milling yield than TAM-200 but substantially higher than Collin. The subjective judgment of the mixograph was fair for TX86V1405 and Collin, fair-good for TAM-200 and questionable-fair for Mit.

Grain from the Uniform Wheat Elite at Bushland, Olney, Dallas and College Station was composited following the 1989 harvest for milling and baking evaluations (Table 7). In mixograph evaluations, TX86V1405 had intermediate levels of whole grain protein, very high milling yield and high flour protein. Ash was lower than any of the checks except Collin. Mixing time was shorter than Collin but longer than the other checks and the subjective mixograph evaluation was as good as any of the checks. Mixograph data from 1990 samples showed similar trends to 1989 samples except that TX86V1405 was longer mixing than any of the checks. Baking analyses of TX86V1405 and the checks in the 1989 and 1990 wheat elite are shown in Table 8. TX86V1405 is a medium mixing wheat with loaf volume equal to or slightly greater than TAMW-101. A notable difference between TX86V1405 and the checks is the tendency toward higher bake water absorption which was higher than any of the checks in 1989 and higher than any of the checks except TAM W-101 in 1990. Also, internal crumb texture was rated good. In general, baking characteristics were judged fair-good.

Grain also was composited from all locations in the Great Plains which harvested the SRPN. Baking tests on the composites were performed at the Hard Winter Wheat Quality Laboratory in Manhattan, KS (Tables 9 and 10). Near infrared procedures were used to evaluate kernel hardness. TX86V1405 had a hardness reading of 68 compared to 69 for Scout 66 and 65 for TAM-105. These results have been confirmed by near infrared analyses of grain samples from various tests at Chillicothe. In all cases, TX86V1405 has graded harder than TAM-200. A miller's subjective score of 6 for TX86V1405 was equal to the score for Scout 66 and 2 units higher than the score for TAM-105. Flour yield was higher than TAM-105 and 0.1% lower than Scout 66 and the overall milling score of 85.4 was considered questionable-satisfactory. Baking data collected on TX86V1405 generally were excellent. The gluten index of TX86V1405 was substantially higher than any of the checks and was higher than all but one of the other experimental entries. Loaf volume corrected for protein level was higher for TX86V1405 than any other entry in the test.

TX86V1405 has been entered in the large scale mill and bake test administered by the Wheat Quality Council. Analyses of these samples will be reported at the annual meeting of the Wheat Quality Council in Kansas City, MO in February, 1991. However, Texas A&M participates as a baking cooperator in these trials and the results of this year's test indicate that TX86V1405 produces a flour which has better overall baking characteristics than the standard bakery flour submitted to cooperators for use in comparisons.

Summary:

9200233

TX86V1405 is a high yielding, white chaffed, semidwarf hard red winter wheat with an array of disease resistance, agronomic characteristics and end-use parameters which warrant its release for commercial production. Its grain yield potential is similar to TAM-200 but it has better overall milling and baking characteristics, produces harder grain and has a lower propensity to lodge. Its primary area of adaptation is the Rolling Plains of Texas although its performance under irrigation on the High Plains has been excellent. It probably is too short for dryland production on the High Plains in most years although it has yielded as well as most other varieties in dryland nurseries. Breeder Seed of TX86V1405 has been released to the Foundation Seed Service for initial increase in anticipation of release. If approved for release, protection will be sought through Title V of the Plant Variety Protection Act.

Proposed Name:

It is proposed that TX86V1405 be released to producers under the name, TAM-202. This is in keeping with the system for naming commercial releases of TAES hard red winter wheats recommended by state small grains workers at their annual meeting in Dallas in 1986. TAM-202 will be the fourth release from the Chillicothe/Vernon wheat research program. Previous releases have been TAM-200, TAM-201 and Siouxland 89.

Table 1. Yield and agronomic data of TX86V1405 and check varieties grown in performance tests at Chillicothe, TX in 1986 and 1987.

	Yield (bu/a)	Test Wt. (lb/bu)	Julian Date to Heading	Height cm.	Leaf Rust Temple	Leaf Rust Uvalde
1986 Preliminary 4:						
TX86V1405	36.8	60.0	98	59	20R	10R
TAM W-101	36.4	59.9	104	64	70S	90S
TAM-105	33.1	58.4	106	69	30S	70S
LANCOTA	32.4	59.4	111	79	20;	20;
MUSTANG	42.2	59.3	97	61	100S	100S
1987 ADVANCED 4						
TX86V1405	36.3	57.4	110	69		
TAM-200	35.4	59.0	111	63		20R
TAM-105	28.9	55.6	118	65		50S
TAM W-101	26.7	54.4	116	61		40MS
MUSTANG	26.5	57.0	112	66		70S
2-Year Average						
TX86V1405	36.6	58.7	104	64		
TAM W-101	31.6	57.2	110	63		
TAM-105	31.0	57.0	112	67		
MUSTANG	34.4	58.2	105	64		

Table 2. Yield (bu/a) and test weight (lb/bu) of TX86V1405 and checks grown in the Centra Texas Yield Trial in 1988.

LOCATION	TX86V1405		TAM-200		COKER 983		MIT		COLLIN	
	YIELD	TEST WT	YIELD	TEST WT	YIELD	TEST WT	YIELD	TEST WT	YIELD	TEST W
Chillicothe	64.0	62.4	63.6	64.3	59.8	61.7	54.5	62.6	52.6	61.7
Dallas	61.5	60.6	65.8	59.8	43.9	55.9	50.7	59.9	61.7	60.0
Prosper	76.0	60.0	67.4	61.8	56.6	59.4	48.6	57.2	66.6	60.5
Overton	38.3	57.0	38.9	61.0	55.6	59.0	29.2	56.0	40.6	61.0
Bushland	50.4	61.5	35.3	61.7	27.6	57.0	19.6	55.6	27.4	57.3
$\bar{X}$	58.0	60.3	54.2	61.7	48.7	58.6	40.5	58.3	49.8	60.1

Table 3. Yield (bu/a) of TX86V1405 and check varieties grown in the 1989 and 1990 Uniform Wheat Elite Performance Test.

LOCATION:	TX86V1405	SIOUXLAND 89	TAM-200	TAM-107	TAM W-101	COLLIN	TAM-201
			1989				
Chillicothe	43.6	41.4	39.5	37.4	35.0	31.2	34.0
Tolbert	27.6	27.6	22.3	25.9	23.2	19.6	24.3
Average for Rolling Plains	35.6	34.5	30.9	31.7	29.1	25.4	29.2
Washburn	9.6	8.9	13.7	13.0	7.1	9.1	9.2
3-Location Average	26.9	26.0	25.2	25.4	21.8	20.0	22.5
			1990				
Chillicothe	56.9	59.7	73.7	64.0	56.2	65.5	71.7
Lockett	54.4	55.8	68.8	65.4	54.4	70.3	73.6
Tolbert	28.1	31.0	29.1	24.4	24.5	35.3	34.4
Olney	55.5	42.2	54.0	43.8	49.4	53.9	54.7
4-Location Average	48.7	47.2	56.4	49.4	46.1	56.3	58.6
Bushland (Irr.)	100.5	77.9	115.8	101.9	98.1	88.5	115.1
Bushland (Dry.)	23.0	17.1	20.2	21.2	17.8	18.3	21.4
Stinnett	35.4	22.7	28.7	31.1	15.5	9.7	21.7
Washburn	43.0	31.0	36.2	38.0	28.8	26.4	30.2
4-Location Average	50.5	37.2	50.2	48.1	40.1	35.7	47.1
Dallas	34.9	35.3	35.5	24.7	23.5	43.8	47.7
Prosper	30.8	35.0	30.0	24.0	19.4	35.9	26.4
2-Location Average	32.9	35.2	32.8	24.0	21.5	39.9	37.1
Overton	49.3	42.5	53.7	36.8	15.4	15.4	38.4
Temple	46.6	41.3	47.7	33.5	35.9	40.5	54.1
12-Location Average	46.5	41.0	49.5	42.4	36.6	42.0	49.1

Table 4. Test weight (lb/bu) of TX86V1405 and check varieties grown in the 1989 and 1990 Uniform Wheat Elite Performance Test.

LOCATION:	TX86V1405	SIOUXLAND 89	TAM-200	TAM-107	TAM W-101	COLLIN	TAM-201
			1989				
Chillicothe	58.1	57.2	59.8	55.8	59.3	57.8	57.8
Tolbert	58.9	58.3	60.6	57.0	57.7	57.7	57.9
2-Location Average	58.5	57.8	60.2	56.4	58.5	58.0	57.9
Washburn	57.9	57.3	59.9	57.8	56.3	55.5	56.5
3-Location Average	58.3	57.6	60.1	56.9	57.8	57.2	57.4
			1990				
Chillicothe	59.9	60.9	61.6	58.9	61.2	60.9	60.1
Lockett	57.2	58.0	59.0	58.3	59.1	60.3	58.6
Tolbert	56.6	60.5	59.3	56.6	58.9	61.8	58.8
Olney	59.0	58.8	59.1	56.8	59.9	60.5	58.1
4-Location Average	58.2	59.6	59.8	57.7	59.8	60.9	58.9
Bushland (Irr.)	63.3	61.8	64.5	60.8	62.6	61.3	61.6
Bushland (Dry.)	56.8	56.3	58.0	55.9	57.2	56.5	56.5
Stinnett	61.2	59.4	62.1	60.8	58.8	59.3	59.3
Washburn	62.6	62.4	64.8	61.6	62.2	62.6	63.1
4-Location Average	61.0	60.0	62.4	59.8	60.2	60.1	60.1
Dallas	57.3	55.1	56.6	52.4	53.1	56.6	55.0
Prosper	54.8	55.6	55.6	53.7	56.4	57.8	55.0
2-Location Average	56.1	55.4	56.1	53.1	54.8	57.2	55.0
Overton	57.0	57.0	58.0	54.0	48.0	55.0	56.0
Temple	54.8	58.2	59.5	54.7	58.2	58.1	57.9
12-Location Average	58.4	58.7	59.8	57.0	58.0	59.3	58.3

Table 5. Days to heading (Julian days) of TX86V1405 and check varieties grown in the 1989 and 1990 Uniform Wheat Elite Test.

	TX86V1405	SIOUXLAND 89	TAM-200	TAM-107	TAM W-101	COLLIN	TAM-201
Chillicothe - 1989	114	113	116	109	117	112	112
Chillicothe - 1990	117	117	116	113	118	114	111
Lockett - 1990	106	109	106	105	114	106	104
Regional $\bar{X}$	112	113	113	109	116	111	109
Bushland (Irr.) - 1990	128	133	129	128	131	129	128
Bushland (Dry.) - 1990	135	138	136	134	138	135	134
Regional $\bar{X}$	132	136	133	131	135	132	131
Dallas - 1990	105	107	101	99	113	94	90
Prosper - 1990	109	117	103	101	119	99	96
Overton - 1990	92	90	90	89	111	80	79
Regional $\bar{X}$	102	105	98	96	114	94	88
Grand $\bar{X}$	113	116	112	110	120	109	107

Table 6. Mixograph analyses of TX86V1405 and check varieties planted in the 1986 Preliminar 4 and 1988 Central Texas Yield Trial.

YEAR/NURSERY	Milling Yield %	Flour Protein %	Water Absorption %	Mixing Time MIN:SEC	Peak Height Units	Subjective Evaluation 1/
1986-PRELIMINARY 4						
TX86V1405		14.8	70.0	4:35	6.8	S
TAM W-101		14.4	66.0	3:20	7.0	S
MUSTANG		13.9	69.0	4:00	6.8	S
LANCOTA		16.9	71.5	2:40	8.5	S
1988-CTYT-MCGREGOR						
TX86V1405	68.8	10.5	60.5	4:00		Q
TAM-200	69.8	9.7	59.7	5:15		Q
COLLIN	52.5	10.4	60.4	6:00		Q
MIT	68.8	11.0	61.0	4:00		Q-F
1988-CTYT-DALLAS						
TX86V1405	72.5	9.2	59.2	5:00		F
TAM-200	84.6	8.9	58.9	3:45		F-G
COLLIN	62.1	10.6	60.6	4:45		F
MIT	75.0	11.3	61.3	3:30		Q-F

1/ S = Satisfactory, F = Fair, Q = Questionable.

Table 7. Mixograph data for TX86V1405 and check varieties in the 1989 and 1990 Uniform Whea Elite Nursery.

	Wheat Protein %	Milling Yield %	Flour Protein %	Ash %	Water Absorption %	Mixograph Mix Time MIN:SEC	Subjective Rating 2/
				1989 1/			
TX86V1405	14.5	58.3	12.9	0.32	62.9	4:15	F-G
TAM W-101	16.0	50.0	13.1	0.36	63.1	3:30	F
TAM-200	15.8	50.0	12.7	0.41	62.7	4:00	F-G
TAM-201	14.8	53.2	13.0	0.35	63.0	3:15	F
COLLIN	14.9	46.0	12.9	0.27	62.9	4:45	F
				1990 3/			
TX86V1405	11.1	76.3			61.1	4:45	F
TAM W-101	11.5	73.1			61.5	4:00	F-G
TAM-200	11.6	71.4			61.6	4:00	F
TAM-201	12.0	75.9			62.0	4:00	F

1/ Mixograph data from a multilocation grain composite.
2/ F = Fair, G = Good
3/ Mixograph data from Chillicothe samples only.

Table 8. Baking data from multilocation grain composites of TX86V1405 and check varieties in the 1989 and 1990 Uniform Wheat Elite Nursery.

	Water Absorption (%)	Mixing Time MIN:SEC	Proof Height (cm)	Loaf Volume (cc)	Bread Height (cm)	Volume[1/] Score	Crumb[2/] Texture
			1989				
TX86V1405	63.0	3:30	7.3	910	11.3	61.6	G
TAM W-101	61.5	3:15	7.6	910	11.3	60.4	F-G
TAM-200	61.5	3:30	7.6	985	11.6	70.6	G
TAM-201	61.0	3:00	7.3	915	11.2	61.5	G
COLLIN	62.5	3:45	7.5	940	11.6	64.6	G
			1990				
TX86V1405	60.2	4:15	7.3	855	10.7		F-G
TAM W-101	60.2	4:00	7.3	845	10.6		F
TAM-200	58.7	4:45	7.4	845	10.6		F-G
TAM-201	61.7	3:30	7.2	830	10.3		F
COLLIN	56.7	3:15	7.4	860	10.8		G

1/ Volume score = (Loaf volume -300/% flour protein -3).
2/ Subjective evaluation. F = Fair, G = Good.

Table 9. Chemical and Milling Data for the Southern Regional Performance Nursery Composites of Hard Winter Wheat Varieties Harvested in 1989.[a]

Variety	Wt/Bu[b] (lb)	Ash (%)	Protein (%)	Sprouted Kernels (%)	Hardness Score[c]		Flour Yield (%)	Milling Score[d]
					NIR	Miller's Subjective		
TX86V1405	59.6	1.46	13.5	10.0	68	6	73.0	85.4 Q-S
KHARKOF	58.4	1.55	15.1	0.5	50 Q	5	71.3	89.9
SCOUT 66	59.4	1.43	14.1	0.3	69	6	73.1	91.7
TAM-105	59.4	1.35	13.4	0.8	65	4 Q	69.6 Q-S	85.2 Q-S
CIMMARON	58.7	1.60	14.5	1.0	60	5	71.8	80.7 Q-U

Table 10. Chemical, Mixograph, and Glutomatic Data for the Southern Regional Performance Nursery Composite Flours of Hard Winter Wheat Varieties Harvested in 1989.[a,b]

Variety	FLOUR			MIXOGRAPH			Glutomatic[e]			
	Ash (%)	Protein (%)	Color Value[c]	Absorption (%)	Mix Time[d] (min)	Tolerance	Wet Gluten (%)	Dry Gluten (%)	Thrus (%)	Gluten Index
TX86V1405	0.42	12.4	76.8	61.0	4.00		31.7	10.9	1.4	95.8
KHARKOF	0.41	14.0	75.2	63.2	3.00	Q	39.8	13.4	7.1	82.2
SCOUT 66	0.37	13.1	81.0	63.0	2.88		38.2	13.1	4.6	88.0
TAM-105	0.35	12.0	78.5	61.5	3.38		34.5	11.6	4.6	86.9
CIMMARON	0.44	13.6	79.2	63.7	4.00		38.9	13.4	4.8	87.9

Table 11. Bread-Making Data for the Southern Regional Performance Nursery Composite Flours of Hard Winter Wheat Varieties Harvested in 1989.[a,b]

Variety	Flour Protein (%)	Bread-Making Data					
		Absorption (%)	Mix Time[c]	Crumb Grain	Loaf Volume[d] As Rec'd (cc)	Loaf Volume[d] Corrected to 13.5% P (cc)	Regression (cc/%)
TX86V1405	12.4	62.7	4.75	Q	1035	1119	78
KHARKOF	14.0	63.6	4.00	Q-S	1003	972	64 Q-S
SCOUT 66	13.1	62.3	3.25	S	970	993	66
TAM-105	12.0	60.9	3.75	S	974	1088	75
CIMMARON	13.6	62.7	5.13	Q-S	985	983	65 Q-S

EXHIBIT E. Statement of the Basis of Applicant's Ownership

Ownership of TAM 202 by the Texas Agricultural Experiment Station (TAES) is based on the fact that unique selections were made at TAES facilities at Vernon, Texas. TAES personnel performed all selection and testing activities. Initial Breeder Seed production was made by TAES.